

CerOrganic Training Curriculum

Module C534

Unit C534a.5:

Organic Farm Management

504387-LLP-1-2009-1-GR-LEONARDO-LMP

Co-funded by the European Union,
through the Leonardo da Vinci Programme

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1.i. Tutor information

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University professor, Head of the Section of Organic Farming, Department of Plant Production and Agroecology, Head of Advisory Center of the Faculty of Agriculture, University of South Bohemia, Czech Republic, Advisor of Ministry of Agriculture. He has been a guarantee of more than 30 conversion to organic farming projects, has published the methodology of conversion to organic farming projection for students and advisors. His current scientific, pedagogical and advisors activities are Agroecology, Organic farming, Sustainable systems of farming, Plant production management especially and alternative Crops (Cereals and Pseudocereals).

Part 1.

The factors affecting the farm management when considering the conversion to organic farming system.

1.ii. Aims & objectives

This lesson is focused on organization and management of the conversion to organic farming project.

The goal of the lesson is to acquaint the trainees with the main factors affecting organization and management of the conversion project, which describes the conversion from conventional to organic farming system, explanation of the importance of locality, personal, economical conditions as the factors affecting the decision process when the farm is planned to be restructured.

1.iii. Learning outcomes & skills

By the end of the unit, the trainees are expected to:

- have an understanding of the complexity of the farm structure constitution
- be competent in searching for resources in the literature and the internet
- be able to analyze critically various solutions leading to decisions on farm management
- have developed consultation skills on farm management

1.iv. Methodology & media

- Studying the sources prepared by the trainer (text and powerpoint materials)
- Studying the recommended literature
- A lecture and discussion of concrete issues of the lesson (locality conditions, personal aspects, economic factors)
- SWOT analysis of the company structure and preconditions for conversion to organic farming systems

The principles of organic farming

2. Main part

The principles of organic farming

- Finding the balance between ecology and production
- Respecting limits:
 - Environmental
 - Social
 - Economical
- Proposal of a farm structure:
 - Economically viable
 - Environmentally friendly
 - Strengthening the social capacity of the region
 - Positively influencing landscape formation and the development of non-productive functions

The preconditions of conversion to organic farming

- Local conditions
- Farm structure
- Human factors

Local conditions

- Level of natural production potential of soils
- Soil horizon
- Soil pH
- Organic matter in soil
- Emissions / degradation

Local conditions

- Organic farming systems are suitable for:
 - Areas with special environmental regime
 - Mountainous and submountainous regions

Farm structure

- Farms optimal for the conversion:
 - Balanced animal and plant production
 - More varied production assortment
 - Usage of barnyard manure and organic fertilization
 - Lower dependence on inputs

Farm structure

- The more specialized the business, the more difficult conversion is.
- Farms without animal production, with high share of arable land and market crops, and those highly specialized in animal production are problematic for conversion.

Animal production during conversion

- Differences between conventional and organic animal production are less significant than those for plant production.
- Similarity of conventional animal breeding conditions and feeding in organic farming decreases production losses during conversion
- During the conversion the livestock rate decreases.

Human factors

- Reasons leading to change of farming system:
 - preservation of the environment,
 - support livestock production based on welfare principles
 - To obtain grants, or the prospect of higher revenues,
 - bio-products sales opportunity,
 - production of more valuable foodstuffs for own consumption,
 - presence of lands in locations with limited inputs.

Human factor - main personal attributes

- age
- mentality
- health
- mobility, flexibility
- qualification profile
- professional training
- spirit of enterprise,
risk behaviour
- personal growth aims
- family structure
- succession situation
- cooperation
- household size

Factors affecting the crop production in different farming systems

Factor	System of farming		
	Conventional	Integrated	Organic
Soil fertility	10	20	35
Weather	10	10	15
Basic agrotechnics	20	25	30
Crop varieties	25	20	10
Fertilizers	20	15	5
Plant protection	15	10	5
Total	100%	100%	100%

Economy during the conversion

- During the conversion there are changes to the farm economy
- Changes in costs relations occur both directions – part of the cost is created or increased, part is decreased or eliminated
- The farm economy declines during conversion

Economy during conversion

- Necessary steps before conversion
- Detailed analysis of farming management and activities during conventional farming
- Analysis of costs
- Accounting for different relationships between yields and costs

Changes in cost relationships during conversion

- Cost reduction

- Animal production

- elimination of part of drugs and specific substances (rut synchronisation)
 - elimination of feed additives
 - limitation or elimination of feeding mixtures

- Plant production

- elimination of herbicides and other plant protection substances
 - elimination of good soluble mineral fertilizers
 - termination of seed treatment

Changes in cost relationships during conversion

- Cost increase (plant production)
 - usage of weeder-mulchers, weeders and other machines, flame weeders
 - under sowings, catch crops (sowing material, labour)
 - better attitude to barnyard manures
 - higher share of handwork in potato, vegetable and fruit production
 - harvest, postharvest treatment, processing, packing, sale

Changes in cost relations during conversion

- Cost increase (animal production)
 - increase the share of farm produced feedstuffs, roughage
 - using the farm produced grain fodder for feeding purposes
 - higher milk consumption by suckling calves
 - purchase of animals for breeding from organic farms
 - additional costs for slaughter, storage, processing, marketing
 - further expansion of trade channels and forms, transport, communication



Farming cost rates and intensity of inputs

	Intensive	Extensive	Organic
Labour requirements	+	0	+
Forward Works	+	0/-	0/-
Capital costs	+	-	-
Yields	+	0/-	0/-
Obtainable market price	0	-	+
Reimbursement/benefits	0	+	+
Costs	+	-	-

+ high, 0 medium, - negligible (*Source: Doluschitz, Schwenninger, 2003*)

Investment costs during conversion

- Necessity of coordination of your ideas with expectations in the field of investments.
- Maximum utilization of existing building and building and machine investments.
- Bigger differences between current conventional and planned organic structure of farming may lead to higher costs

Building investments during conversion

- enlarging storage capacities conserved forage crops,
- reconstruction of stabling for open housing, eventually bedding system,
- enlarging of cattle-ranges, pasture area, shelters, watering-places,
- modification of dung-yards, sewage and stale pits, composting areas.

Building investments during conversion

- milk processing equipments (pasteurization, cooler),
- slaughter, meat processing equipments, cooling and storage of meat,
- enlarging and dividing of storage area for market crops (wider assortment),
- establishment of cleaning and sorting line, dryer houses, equipment for scalping, milling, scrubbing and packing of crop products.

Machine investments during conversion

- mulch-laying machines, cultivators, harrows (weeder, line) ,weeders, rotary cultivators,
- technology for treatment of barnyard manures (loaders, shovellers, cascading machines),
- machines for barnyard manures application (spreaders, tank truck with application equipment for sewage and stale).

The principles of organic farming

3. Conclusions

The conversion to organic farming system represents essentially a system change. A thorough analysis of the objective and subjective preconditions for conversion to organic farming is necessary prior to conversion.

The better the structure and function modification of the agro-ecosystem are prepared for organic farming, the easier the management of the farm and its activities after conversion will be.

3.i. Summary

This lesson is focused on understanding the relationship between the environmental, personal and socioeconomical factors of a farming company. Considering the restructuring will facilitate evaluation of its position, capabilities and the reasons leading to the consideration of conversion. The basic precondition for assessment of the efficiency of the projected organic farming system is analysis of the locality potential and its comparative advantages, and the analysis of individual sector efficiency within conventional farming as the precondition of the determination of the company structure changes and the methods of organic farm management during the conversion period and afterwards.



Part 2

Organic Farm Management

1.ii. Aims & objectives

This unit focuses on the principles of crop production management on an organic farm.

The goal of the unit is to acquaint the trainees with the main factors affecting the organization and management of organic plant production, which describes the principles and economical aspects of crop rotation planning, selection of suitable crops and varieties for organic farming, targets of soil cultivation and nutrient balance, and crop protection.

1.iii. Learning outcomes & skills

By the end of the unit, the trainees are expected to:

- have an understanding of the complexity of principles of crop production management on an organic farm
- be competent in searching for resources in the literature and the internet
- be able to analyze critically various solutions leading to decisions on farm management
- have developed consultation skills on farm management.

1.iv. Methodology & media

The Unit is composed of:

- (a) lectures based on PowerPoint presentations
- (b) textbooks, articles
- (e) group interaction and discussion



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2. Main part

The principles of organic farming

- Organic farming is based on relatively closed production and balance (material and energetic) cycles, and prefers rational biological inputs for effective ensuring of high-quality production with regard to agro-ecosystem quality.
- The fundamental methods are risk minimization and harmonisation of agro-ecosystem production and non-production functions at the farm level.

Main goals of organic farming

- 1) Sustainability and improvement of soil-fertility, soil erosion elimination
- 2) Protection of genetic resources and preservation of biodiversity.
- 3) Preservation of landscape elements and their harmonisation.
- 4) Preservation of water in the landscape, protection of surface and ground water against the pollution.
- 5) Effective energy utilization, orientation to renewable resources.

Main goals of organic farming

- 6) Nutrient recirculation and avoidance of extraneous substances in the agro-ecosystem.
- 7) Crop production in accordance with the natural conditions of the given locality.
- 8) Animal husbandry (livestock production) according to welfare principles, coordinated with crop production on the farm
- 9) Production of high-quality foodstuffs and raw materials.
- 10) Optimisation of living conditions for all associated organisms, including human beings.

The principles of crop rotation

- selection of cultivated plants and their representation in the crop rotation must take into account the local conditions,
- crop structure must enable rotation of crops enriching soil with organic matter (carbon source) with crops that weaken soil (exhausting the carbon),
- crops that compromise the soil structure and its physic-chemical characteristics must be rotated with crops that improve these characteristics.

The principles of crop rotation

- to rotate crops with specific nutrient requirements, especially those crops dramatically exhausting carbon level with crops that deliver or fix carbon,
- to increase leguminosae rate in rotation to 20-25 %, and to start the conversion with clovers because of weed reduction,
- to rotate crops with weaker root systems with heavily rooting crops, as well as shallowly and deeply rooting crops.

The principles of crop rotation

- to take into account the influence of water-intensive crops on the soil water regime
- to compensate for insufficient recycling of organic matter from root and above-ground post harvest residues, by the cultivation of intercrops,
- to extend the system diversity with the aim to limit harmful factors and support soil microbial activity by means of varied species diversity (use of intercrops, mixtures of varieties and species, extension of crop rotation).

The principles of crop rotation

- to rotate crops with weak and strong competitive advantages against weeds, to use systemic measures for weed regulation (rotation of crops, intercrops, undersowing etc.),
- to select species and varieties resistant to or tolerant of significant harmful agents, (diseases, pests),
- to maintain sufficient intervals between crops attacked by the same diseases and pests.



The principles of crop rotation

- to ensure maximal soil cover by plant stands throughout the year with the aim of immobilization and nutrient recycling, weed control, and evaporation and erosion control,
- to rotate crop species so that after harvesting sufficient time remains for soil preparation for subsequent crops,
- to limit cultivation of similar species of plants in sequence. Repeated cultivation should be based on rotation of sorts, varieties, spring and winter crops, and more intensive crops with less sensitive crops.

The economical aspects of drawing up a crop rotation

- the need for own-produced roughage and grain feeds resulting from the feed balance,
- the need for own seeds and seedlings, to ensure their own contractual production respectively,
- economic, political and production aspects limiting cultivation of crops (contingents, prices, grants, limitations in relation to resource preservation etc.).

The economical aspects of drawing up a crop rotation

- concluded or anticipated contracts for delivery of cash crops of particular quality,
- building, technical and technological equipment of the company or treaty reinsurance of crop production, postharvest treatment, event
- storage of produce,
- labour and professional capacity of the company in relation to intended transformation of arable crop structure.



Crop rotation planning

- Specify distribution (%) of individual crops and number of land tracts,
- Organize individual land tracts,
- Place the crops in turn,
- Abrupt conversion simplifies and shortens the conversion period, will enable faster sale of bio-products, but at the price of the loss of advantageous influence of preceding crop, lower revenues and also subsequent higher strain.

Crop rotation planning

- If it is decided to implement the conversion very quickly (during 1-2 years), a temporary crop rotation is applied. At the price of reduction of revenues high share (50 % and more) of leguminosae is included.
- If there is 25% or 33 % representation of leguminosae in the target crop rotation, it is advisable to distribute the conversion over a three- or four-year period.

Selection of suitable plant species and varieties for organic farming

- the variety is well-proven in organic farming
- the suitability for the locality (soil and climatic conditions)
- good weed resistance
- varieties resistant to predominant diseases in the area
- nutrient uptake ability (low-input varieties with a strong root system)
- longer vegetation period
- satisfactory yield
- qualitative characteristics (processor's request)

The targets of soil cultivation

- by means of soil loosening to enable the growth and root penetration deep into the soil profile
- to improve the soil aeration (penetration by oxygen and nitrogen)
- to support edaphon activity
- to increase water infiltration

The targets of soil cultivation

- to decrease evaporation
- to destroy or to limit weeds, diseases and pests
- to defray into the soil plant residues and fertilizers
- to eliminate the soil compaction caused by previous operations
- to enable establishment of the stand



Soil cultivation



Nutrient balance - assessment procedure

- The sowing structure and total yield is defined
- Calculation of total nutrient requirements
- Calculation of nutrient losses
- Source of nutrient balance
 - a) from rainfall
 - b) from crop residues
 - c) from barnyard manures
 - nutrient sources in total ($a + b + c$)

Nutrient balance - assessment procedure

- Nutrient balance of a farm:
nutrient sources – nutrient demands =
nutrient deficit or excess
- Nutrient production from green manure
- Resulting nutrient balance for the calculation of nutrients from green manure

Nutrient balance

- Farmyard manure
- Suds
- Slurry
- Composts



Crop protection

- The main principles of harmful organism regulation
 - Care of soil fertility and its high biological activity
 - Maintenance of balanced ratio of harmful organisms and their antagonists.
 - Preference of preventative methods for plant protection.
 - Utilization of physical, biological engineering and biological ways for regulation by direct intervention against harmful factors

Crop protection

- Indirect methods for pest and pathenogenic agent regulation:
 - Nutrition
 - Cultivation of suitable plant species
 - Selection of varieties
 - Cultivation methods
 - Crop rotation
 - Regulation of weeds

Crop protection

- Planning weed control measures
 - Analysis of weed control measures in conventional farming
 - Mapping of weed presences
 - Proposal of preventive measures for individual lands
 - Proposal for mechanical weeding



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3. Conclusions

3.i. Summary

This unit focuses on the principles of crop production management on an organic farm. Crop production consists of number of operations coherent in time and function. At a company level there is crop structure, rotation of crops and selection of suitable species and varieties, systems for basic and pre-sowing soil preparation, plant nutrition and fertilization, regulation of harmful agents, maintenance of stands during the vegetation season, harvest, postharvest treatment and storage.

Part 3

The principles of the organic farm structure management

1.ii. Aims & objectives

This lesson is focused on the principles of environmental aspects of agricultural activities.

The goal of the lesson is to present linkage between farming and it's influence on environment and landscape. Lesson contains description of tools for balancing agricultural and environmental components of farmign activities – Farm planning, assessment of the environmental stability, programmes of sustainable farming in the countryside and farming intensity limits.

1.iii. Learning outcomes & skills

By the end of the unit, the trainees are expected to:

- have an understanding of the complexity of principles of environmental aspects of agricultural activities
- be competent in searching for resources in the literature and the internet
- be able to analyze critically various solutions leading to decisions on farm management
- have developed consultation skills on farm management



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2. Main part

The principles of organic farming

- One of the main principles of organic farming, is to farm environmentally. Farms
- The range and structure of crop and livestock production must be harmonized from the production and ecological point of view as well.
- Suitable share of own fodder resources for livestock production and optimal use of barnyard manures for crop production eliminates the volume of extraneous inputs.

Main factors affecting loading of ecosystem by farming activities

- Disturbance of the landscape structure - land tracts area increase, landscape elements elimination; alluvial plains, high-diversity meadows and pastures ploughing up and dewatering
- The landscape does not provide suitable live conditions for wild plant and animal species
- Threat to valuable habitats and rare and endangered plant and wildlife species due to improper farming practices

Main factors affecting loading of ecosystem by farming activities

- Threat of soil erosion and other soil-degradation processes (soil profile compacting, acidification).
- Ecosystems endangered by the use of chemical biocides and stimulators.
- Natural plant communities endangered by succession - the number of livestock have decreased and the amount of biomass exceeds; number of goat and sheep as suitable species to be used for maintenance of some environmentally valuable localities is insufficient.

Main factors affecting loading of ecosystem by farming activities

- Endangered natural biodiversity of ecosystem due to the invasive weeds and allochthonous plant species.
- Endangering of permanent grassland due to excessive manuring rates.
- One-phase harvest of permanent grasslands limits the reproduction and shelter opportunity and thus the natural species biodiversity.
- Elimination of some indigenous crop and livestock species.



Assessment of aspects of sustainable farming in the landscape

- The landscape stability and the environment resistance assessment (a feature of a natural landscape subsystem).
- The landscape productivity and potential assessment in terms of specific activities (the preconditions of human landscape exploitation).

Assessment of aspects of sustainable farming in the landscape

- The assessment of risk, threatening and stress to the landscape (actual conditions of a landscape utilization and risk related).
- The assessment of landscape potential in terms of sustainable utilization (as a combination resulting from foregoing steps).



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Development of the Environmental System

- Aim of environmental and landscape preserving activities should lead to revitalisation of the harmonious landscape with a high rate of environmental stability.
- Development of the Environmental Systems is composed of biocenters and biocorridors and other components, e.g. protective zones.

Assessment of the environmental stability

- The knowledge of a landscape environmental stability is an important condition of the landscape potential, i.e. the way and extent of the landscape elements exploitation.
- The environmental stability coefficient expresses the area share between permanent (forests, natural grasslands, special crops, gardens, wide-ranging vegetation, clean water) and short-term or anthropogenic structures (arable land, polluted water, urban areas).

Assessment of the environmental stability

- The environmental stability coefficient (KES) can be roughly defined as the ratio between the area of positive and the negative landscape elements on agricultural land multiplied by the ratio between the area of positive and negative landscape elements on non-agricultural land.



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Share of structural elements on the landscape stability

Impact of farming activities on environmental stability

- the share of intercrops
- the share of clover plants
- follow the principles of crop rotations
- the range of soil cultivation operations with the soil erosion preservation effect (reversible ploughs, deep tillers)
- using double or flotation tyres
- the range of sewage application during the year

Impact of farming activities on environmental stability

- aggregation of the sowing and tilling machines
- the nutrient balance as a base for manuring
- use of biocides and other chemical agents for sowing material treatment and crop protection
- harvest management of close stands (wildlife protection)
- management of transport on land during the harvest of root and tuber crops and silage crops (soil compaction elimination).



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Farm planning

- The way of complex management of a farm in the countryside landscape using the Farm Plan of sustainable farming has become one of the latest European directions of the landscape management and preservation of the environment.

Farm planning

- The Farm Plan is especially helpful when following spheres are concerned:
 - the aspect of flora and fauna on farm land – preservation of wildlife conditions
 - the most effective use of agro-environmental schemes
 - applying the GAEC principles concerning natural resources exploitation and pollution development

Farm planning

- Structure of the Farm plan:
 - farm description – a brief overview of the farm and its structure from the local, regional and national point of view
 - determination of goals for given plan and farm with respect to landscape priorities and biodiversity
 - action scheme
 - recommendation of present landscape elements management

Farm planning

- Structure of the Farm plan:
 - proposal of new ecotopes and landscape elements and new opportunities of the biodiversity preservation
 - farming activities, resources management – the assessment of the environmental impact of the farm including manures and waste management, improvement proposals
 - a map of the landscape – containing understandable proposals and recommendations

Farm planning

- The Farm Plan is a helpful tool for environmental planning of a farm and farming activities as well as a guide to agro-environmental programmes application.
- It is a methodical guiding principle, but not a substitution for professional consulting services provided by an experienced consultant.

Management of the ecological infrastructure within the sustainable farming systems

1. defining the land borders
2. ensuring the impassable land borders for higher wildlife to keep the desired species inside and the undesirable ones outside
3. ensuring the safe natural shelter for higher wildlife
4. ensuring the climatic effects protection of plants using three wind-breaks above all

Management of the ecological infrastructure within the sustainable farming systems

5. elimination of the water and wind erosion
6. ensuring sufficient amount of sunlight, water and nutrients for the crops cultivated
7. ensuring suitable means of weed, disease and pest prevention of the crops cultivated

Management of the ecological infrastructure within the sustainable farming systems

8. support of the development of beneficial plant and animal species
9. building natural shelters, migration corridors for wildlife species
10. ensuring suitable feed opportunities for the beneficial species
11. contribution to the soil preservation using the means available



Programmes of sustainable farming in the countryside

- are based on the main ideas and principles of sustainable farming in local conditions
- conception consists of a complex solution to three mutually interconnected spheres: ecological, economical and social, with the aim to define the optimal line between man and the nature.

Polyfunctional landscape exploitation

- protection and revitalisation of the landscape and its (water, soil, air, biota);
- sustainable economic utilisation (population food resources, water resources, technical crops, production and exploitation of the renewable energy resources);
- non-production exploitation of the landscape, cultural and social development of the countryside (living, recreation, sport, education, training, medication).

The farming intensity limits

- Nitrate Directive
- Principles of an Appropriate Farming Practice
- Good Agricultural and Environmental Condition (GAEC)
- Agro-environmental Principles
- NATURA 2000



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3. Conclusions

3.i. Summary

This lesson is focused on understanding the principles of environmental aspects of agricultural activities. Farms and companies applying these principles should aim to preserve the natural landscape elements typical for given locality, to respect the biodiversity preservation principles with the stress put on biotopes protection. Useful tools for developing of sustainable agricultural systems are farm planning, assessment of the environmental stability, programmes of sustainable farming in the countryside and farming intensity limits.

3.ii. References

Basic bibliography

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Web pages / links

<http://europa.eu.int/>

<http://www.fao.org/organicag/>

<http://www.ifoam.org/>

<http://www2.zf.jcu.cz/~moudry/>

3.iii. Evaluation of Learning

Assignment includes SWOT analysis :

- Identification of the Strengths, Weaknesses, Opportunities, and Threats to a farm on conversion
- identifying the internal and external factors
- decision making,
- development of strategies and plans

What's Next?

- The basic knowledge required to predict a farm's conversion to organic farming are developed within the lessons
- The main principles of plant and animal production and links between production processes
- The inter-relationship of ecosystem components and the effects of measures applied by the farmer.
- The basic knowledge required to plant production management
- The main principles of agricultural productions and connection with environmental aspects of farming
- Creation of environmental and natural structures on organic farms

For more information on this unit:

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